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UNITED STATES NAVY

MEDICAL NEWS LETTER

Vol. 37 Friday, 5 May 1961 No. 9

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Policy

The U. S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

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Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget (19 June 1958).

Heat Stroke

CAPT James P. Knochel MC USA, et al, Department of Medicine, Walter Reed Army Hospital, WRAMC, Washington, D. C. The Renal, Cardiovascular, Hematologic and Serum Electrolyte Abnormalities of Heat Stroke. Amer J Med 30:299-309, February 1961.

Acute heat stroke in its classic form represents one of the few true medical emergencies which, despite immediate vigorous treatment, continues to impose an unfortunately high mortality on its victims.

In studying cases of heat stroke as they occur in military and civilian life, a distinct difference in the clinical setting is noted between the two groups. Outside the military, most cases are seen in older persons who often have arteriosclerosis, heart disease, or acute alcoholism. Heat stroke also occurs with increased expectancy in children suffering from fibrocystic disease and in those who are unable to sweat effectively. Among the latter group are persons having congenitally absent or defective sweat glands or patients undergoing surgical procedures who have been heavily draped following use of atropine or drugs of similar action. In the Army, heat stroke is most frequently seen in young persons in basic training. Certain investigators have stressed lack of adequate acclimatization to a hot environment as an important factor in its development.

Renal Failure in Heat Stroke. Acute renal tubular necrosis complicates heat stroke in 2 to 9% of cases; its incidence appears related to the degree of hyperpyrexia and prolonged shock. The usual cause of death in reported cases has been fulminating hyperkalemia incident to massive tissue necrosis, and marked catabolic response—a frequent early feature of acute renal failure. Failure to recognize this renal complication early in the course of treatment probably explains the tendency to overhydrate such patients.

According to one report in the literature, the sign most suggestive of acute renal failure in heat stroke is oliguria, a feature which seems to be substantiated by other observers. Therefore, it is suggested that the possible development of renal failure be considered in every case of heat stroke and careful attention be given to urinary output. If the patient fails to excrete urine after shock has been corrected, diagnostic steps and treatment should be instituted on the assumption that the patient has incurred acute renal failure.

Sweating which is absent during the acute stage of heat stroke in most cases reappears after 24 to 72 hours. This must be carefully considered in managing fluid balance, particularly if sweating does not reappear.

Electrolyte Derangements. With increasing use of flame photometry, reports of serum electrolytes in heat stroke have disclosed remarkable changes, especially with regard to serum potassium. In the early stages of heat stroke the serum potassium is low. In most instances serum CO_2 likewise is depressed and, although no values for blood pH have been reported,

it is likely that this combination could be the result of respiratory alkalosis secondary to the hyperventilation of hyperpyrexia.

A low level of potassium in the early phase of heat stroke may have its origin in the process of acclimatization to heat. In this physiologic change the adrenal cortex plays a definite role in renal conservation of sodium and, concomitantly, urinary excretion of potassium may increase to amounts exceeding normal.

Unfortunately, all studies in the past with regard to potassium balance have been performed on persons who had not incurred actual heat stroke. Nevertheless, it is entirely possible that hypokalemia may constitute an integral factor in development of the manifestations of heat injury. This is entirely consistent with such manifestations as weakness, lethargy, isosthenuria, and Pitressin-resistant polyuria.

Myocardial Damage in Heat Stroke. Subendocardial hemorrhages showing a predilection for the left side of the interventricular septum have been reported. In one report there were hemorrhages into the cardiac muscle in one-fifth of the cases; rupture of muscle fibers was conspicuous in well over one-fourth.

As a result of animal experiments, it has been shown that cardiac output doubles with a rise in temperature from 37 to 42 C, but falls rapidly at higher temperatures. Oxygen consumption behaves in a similar fashion, showing a progressive increase up to 42.4 C, followed by a sharp decline which implies a marked tissue anoxia. In experiments reported, circulatory collapse was shown to be predominantly peripheral in nature but attended by a definite impairment of cardiac reserve. Ordinarly, simple reduction of body temperature by ice bath immersion and vigorous massage of the extremities will improve circulatory hemodynamics in patients who go on to recovery.

Administration of intravenous fluids to a patient with heat stroke may precipitate pulmonary edema. Aged persons and others with compromised myocardial reserve would be especially liable to such a complication.

Use of norepinephrine in treatment of heat stroke leads to cutaneous vasoconstriction and directly impairs the transfer of heat from deeper tissues to the skin. In addition, use of corticosteroids in conjunction with vasopressors, although of proved value in some cases of refractory shock, should be attempted only with extreme caution in view of the excessive splanchnic vasoconstriction due to their synergistic effect. In short, heat stroke is best managed by rapid cooling to be followed by vasopressors only in the event that shock does not respond to correction of hyperthermia.

Electrocardiographic Changes. Most reports indicate T-wave changes which usually revert to normal in due time. Although electrocardiographic findings have not been adequately reported in many of the large series of cases of heat stroke, it is entirely possible that changes of myocardial infarction are not unusual.

Injury to the Liver. Occurrence of hyperbilirubinemia and clinically apparent jaundice in heat stroke is common. As a rule, liver function eventually returns to normal with recovery.

Hematologic Abnormalities. Study of patients with heat stroke with the aid of autotransfused Cr^{51} tagged red cells, and in the absence of detectable blood loss, demonstrated a significant decrease of the red cell survival in 13 of 15 subjects. All showed thrombocytopenia, and during the initial phase of illness all showed an unexplained absolute increase in eosinophil count. It was concluded that development of anemia in the course of heat stroke was due both to hemolysis—possibly secondary to capillary stasis—and to direct injury to the bone marrow.

Use of dextran in treatment of shock in the early stage of heat stroke may be fraught with considerable danger. Dextran has been shown to have a direct inhibitory effect on the function of platelets when given in significant amounts. In the presence of thrombocytopenia, even slight impairment of platelet function by dextran may have devastating effects.

Several investigators have demonstrated acute megakaryocytic injury, thrombocytopenia, purpura, and decrease of prothrombin concentration, the latter secondary to hepatic damage, during the course of heat stroke. Another has recorded abnormalities of coagulation manifested by heparin sensitivity and abnormalities of prothrombin consumption, thromboplastin generation, clotting time, heparin titration, one-stage prothrombin, accelerator globulin, clot retraction, and thrombocytopenia in patients with acute tubular necrosis, although no major statistical difference was found between bleeding and non-bleeding patients.

Wright postulated a precipitation of proteins involved in blood coagulation, and others have stressed the importance of anoxia productive of direct capillary damage as contributory factors in production of the hemorrhagic complications of this disorder.

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Genetic Factors in Etiology of Duodenal Ulcer

David A. Price Evans MD, Department of Medicine, University of Liverpool, Liverpool, England. Gastroenterology 40:371-378, March 1961.

Physicians have long realized that duodenal ulcers tend to run in families, but in this last decade more accurate evidence about the nature of the inherited constitution, or "diathesis," prone to development of this lesion has come to light.

One study showed that peptic ulcers occur about two to two and one-half times as frequently among the living siblings of peptic ulcer patients as among comparable groups from the general population. Another report compared the site of the ulcer and showed that relatives of gastric ulcer patients tended to have gastric ulcers, whereas relatives of duodenal ulcer patients tended to have duodenal ulcers.

Since these studies were published, new lines of research have indicated possible contributants to this heritable disposition.

ABO Blood Groups. Investigation of this factor showed blood group O to be strikingly high and other groups correspondingly low in patients suffering from peptic ulcers. This observation has been confirmed in repeated studies. One important refinement to the original association was discovered in many of these confirmatory studies—strong association of duodenal ulcer with the O blood group. As a result of multiple studies, then, it may be taken as an established fact that series of duodenal ulcer patients contain a significantly higher percentage of group O persons than do control series from the general population.

Salivary ABH Nonsecretion. It has been known since 1932 that some persons have ability to secrete ABH substances in a water-soluble form into their saliva. This is a dominant character. A group in Liverpool studied the incidence of salivary ABH nonsecretion in series of duodenal ulcer patients and found it to be significantly higher than in controls. This has also been confirmed. There is, then, a distinct possibility that the associations may be causal in nature, but at present the evidence does not prove the view nor does it render the idea untenable.

Physiologic Investigations. Physiologic disturbances associated with duodenal ulcer involve the stomach which is an important site of production of blood group substances. Therefore, it is worthwhile to look for differences in gastric function connected with blood group and secretor phenotype.

There seems to be a gradation of gastric disorders which varies from high acid output to low acid output; group O persons seem to be more prone to high acid output disorder, and group A persons to the achlorhydric disorder. Results of studies along this line suggest that there may be an effect other than blood group substance formation and this may have a bearing on the mechanism of production of duodenal ulcer.

The influence of hydrochloric acid secretion on stomal ulcer is well known. Statistically, it has been found that the mean weighted relative risk is much greater for stomal ulcer versus control than for duodenal ulcer versus control. In other words, stomal ulcer—which represents in a way an advanced form of duodenal ulcer—shows a much stronger association with blood group O.

One group of investigators suggests that salivary ABH nonsecretors might be more prone to develop duodenal ulcer because they may have smaller concentrations of blood group substances in their body liquids. However, results of many observations do not substantiate this specific factor as the etiologic cause of duodenal ulcer.

Taken at face value, data suggest that the liability to ulceration due to being simultaneously blood type O and ABH nonsecretor is more than would be expected from the additive effects of the two phenotypes; data also indicate that they interact with one another. However, analysis reveals that the excess liability is not statistically significant.

Importance of Characters in Etiology. The practicing clinician wishes to know, "How much contribution do these two genetically determined characters make statistically to the total ulcer problem?" It can be estimated that

if the O and ABH nonsecretor characters were removed from the Liverpool population in the Liverpool environment, there would be 20 to 25% fewer duodenal ulcers in that population.

From the biologic point of view these studies of duodenal ulcer are interesting because they represent the selective effect of environment on a presumably balanced polymorphic system of eight phenotypes. This effect of environment is unlikely to be an important factor in maintaining the polymorphism in the human population. The maintenance of the system probably depends upon some much more basic effect—possibly on fertility, for example.

One may speculate that if the recent apparent increase in incidence of duodenal ulcer all over the world is a true phenomenon, then the environmental influence is now operating more strongly than in the past.

The practical implication of viewing duodenal ulcer in this way is that by studying in detail the environmental influences acting on phenotypes of different susceptibilities, one may get a clue to the factors in our environment which cause duodenal ulcer. For example the environmental influence might be expected to be much stronger in A secretors who develop ulcer than in O nonsecretors who do not develop duodenal ulcer.

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Biologic and Psychologic Features of Ulcerative Colitis

George L. Engel MD, University of Rochester School of Medicine and Dentistry, Rochester 20, N. Y. New Frontiers in Ulcerative Colitis: Biologic and Psychologic Features of the Ulcerative Colitis Patient. Gastroenterology 40: 313-322, February 1961 (Part 2).

During the past 10 years, I have had a particular interest in ulcerative colitis and have been concerned with the care of approximately 50 patients with this disease. I have tried to learn as much as possible about the natural history of the ulcerative colitis patient and to identify factors which may operate in relationship to remissions and relapses. The ultimate objective has been to identify the conditions necessary and sufficient for development of this disease.

Accordingly, I would list 10 features characterizing ulcerative colitis and the patients who suffer from it. These are characteristics which require consideration in constructing and evaluating any concept of pathogenesis.

1. The disease is not known to occur spontaneously among species other than man.
2. The disease may begin at any age and in either sex; most patients have first manifestations either in middle childhood, adolescence, or early adult life.
3. In general, no particularly impressive family incidence is observed, although an occasional family will reveal a striking pattern of occurrence.

4. Characteristically, ulcerative colitis is a recurrent disease. The first attack may be overlooked when it consists of only a transient episode of rectal bleeding. After total colectomy and ileostomy, relapses may involve previously uninvolved small bowel.

5. The disease characteristically involves the lining membrane of the bowel in a manner suggestive of a disturbance of cellular or molecular systems or of a response to microscopic, submicroscopic, or molecular noxious agents. Other phenomena, such as arthritis, iritis, erythema nodosum, et cetera, also indicate similar processes distant from bowel, either primary or secondary.

6. Prolonged and detailed psychologic observations of many ulcerative colitis patients have revealed an impressive consistency of certain psychologic features among this population.

7. Psychologic investigation of circumstances immediately preceding onsets and relapses of this disease also reveals consistent findings. In general, the disease becomes manifest during periods when the patient is either feeling, or attempting to defend himself against feeling, hopeless or helpless. Such feelings may exist quite transiently or may persist for long periods, but in general, the symptoms of colitis—particularly bleeding—begin within hours or at the most within one or 2 days. Such effects are precipitated by real, threatened, or fantasied losses or separations from loved persons, goals, objectives, ideals, et cetera, of which the patient may or may not be conscious.

8. Conversely, reestablishment of the threatened relationship, whether by virtue of intrapsychic change, environmental change, or vicariously through establishment of a relationship with the physician, is generally associated with a relief of the affect state of helplessness or hopelessness and a remission of the disease.

9. When these patients use different psychic mechanisms to deal with real, threatened, or fantasied losses, and successfully avert the affects of helplessness or hopelessness, other manifestations may appear, but not colitis. These may include psychologic symptoms or behavioral changes which are accentuations of trends already present, including neurotic or psychotic phenomena, and sometimes other somatic disturbances.

10. If the affect states of helplessness or hopelessness persist or recur, the effectiveness of ACTH or adrenal steroids is significantly reduced, so that either the patient does not respond or relapses after a good response in spite of continued treatment.

How have these facts influenced concepts of the pathogenesis of ulcerative colitis? We postulate that a number of factors must be present and operating before the disease can develop. We are concerned not only with the mechanisms operating at the end organ, the colon, but also with factors which may render the end organ vulnerable and which may determine when the tissue change takes place and when it resolves. These include processes which may be considered as facilitating, conditioning, or permissive, some

of which may originate at a distance and only secondarily exert an influence on the bowel. The goal is to establish which conditions are necessary and what combination of conditions is sufficient to permit the disease to become manifest.

The following hypotheses are worthy of further study:

1. Only certain individuals have the capacity to develop ulcerative colitis. This susceptible population presumably shows considerable variation in vulnerability, so that some may never develop the disease because they were never subjected to all the necessary conditions, whereas others may develop it readily and early in life. This implies the operation of a factor which is either genic or acquired during fetal or early life. This might be called the primary biologic factor.

The relative homogeneity of the psychologic processes also suggests a common biologic soil or a common experience, or both. Since psychologic development depends not only on the experiences and relationships of the child during development, but also on the nature of the neural equipment he has to begin with, there may also be distinctive biologic characteristics of brain-mind which contribute to the relative homogeneity of this group. Nor can we overlook the influence of somatic processes—including processes involving the bowel—on psychologic development, especially during the formative years of early life.

2. The particular psychic state immediately preceding attacks of colitis is nonspecific insofar as colitis is concerned, and yet seems to have the qualities of a necessary condition. Our present working hypothesis is that what is experienced psychologically as the affects of "helplessness" and "hopelessness" also reflects biologic states of relative disorganization of the organism as a whole, during which protective or homeostatic devices mediated through higher neural or neurohumoral centers are either interfered with or in some way rendered less effective, thereby permitting certain organic disease processes to develop.

We must recognize that what we experience as effects are complex psychologic experiences of bodily states, and that developmental, somatic, and biologic processes long precede not only their psychic expression, but also the individual's awareness of them. Thus, these states are first biologic with no psychic representation and only later biologic and psychologic, either unconscious or conscious. The psychic states of "helplessness" and "hopelessness" do not cause anything; they merely mirror a state of the organism as a whole.

3. The psychologic features of ulcerative colitis patients are distinctive in that they render this particular group of people unusually vulnerable to losses and separations. Not only do they have a more limited capacity to establish and maintain relationships, but also they have a more limited capacity to adjust to such losses and separations and, hence, they are more prone to experience the states of "helplessness" and "hopelessness." Knowledge of these psychologic characteristics

makes it possible to predict the circumstandes under which these patients are most likely to develop an attack of colitis. If we can anticipate such circumstances, it might not be too much to hope that we may succeed in influencing circumstances so that attacks do not occur.

What has been presented is not intended as an alternative or replacement for some of the mechanisms that have been and are being considered as operating in ulcerative colitis. Rather, it is an attempt to enlarge the perspective so as to include more factors which may be operating in the organism as a whole.

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Thromboangiitis Obliterans: Fact or Fancy

Stanford Wessler, Department of Medicine, Harvard Medical School, Boston, Mass. Editorial, Circulation 23:165-167, February 1961.

In a recent review of experience at Beth Israel Hospital in Boston (New Engl J Med 262:1149, 1960) it was concluded that the disease originally described by Buerger is indistinguishable from atherosclerosis, systemic embolization, or peripheral arterial or venous thrombosis, singly or in combination. Despite difficulties inherent in establishing a negative hypothesis, impartial examination of the entire evidence provides overwhelming support for the opinion that Buerger's disease has never been and is not now an entity in either the clinical or pathologic sense.

In view of current knowledge of the relative frequency of atherosclerosis among young men, it is no longer reasonable to consider age and sex as distinguishing features of Buerger's disease. Buerger's original investigations were completed in an era when neither the frequency of clinically significant atherosclerosis nor the ubiquity of thromboembolism was fully recognized. They also preceded by several decades the extensive observations on the high incidence of coronary atherosclerosis in young men. Although use of tobacco and presence of clinical phlebitis have been considered important findings in the diagnosis of Buerger's disease, no reports were uncovered in which these relationships were established through use of control studies. It is now also clear that the secondary and tertiary lesions of thromboangiitis obliterans are nonspecific and may result from arterial obstruction from any cause, and that the extent of perivascular fibrosis is no greater in thromboangiitis obliterans than in other thrombotic disorders.

Since the etiology is unknown, the clinical features of the disease are not diagnostic, and the intermediate and healed morphologic lesions are nonspecific, validation of the disease as an entity must rest, finally, with the acute lesions, which Buerger considered to be "absolutely diagnostic." The acute vascular lesion has occasionally been described in superficial veins, but only rarely in deep veins or in arteries. The paucity of such acute lesions in the deep vessels has usually been attributed to the fact that the affected

limbs are amputated only in the late stages of the disease. However, if the natural history of Buerger's disease is indeed that of an episodic, recurrent, and relapsing process, it is remarkable that the traces of the acute lesion are reported so rarely in these specimens.

Fortunately, the issue of the identity of thromboangiitis obliterans does not, in the final analysis, turn on the inconclusive evidence of whether or not an acute arterial lesion has been seen. It rests, rather, on the specificity of this acute vascular lesion, a question that, for want of adequate arterial lesions, can best be approached in the vein, where the morphologic findings are well documented.

There are now sufficient data concerning the morphologic response of arteries and veins in many pathologic processes to indicate clearly that the arterial response does not necessarily mimic the venous reaction. Even granting the existence of a comparable lesion in arteries, however, one must be able to justify the calling of such a lesion specific in the absence of a definitive clinical picture or pathognomonic, morphologic, or etiologic components. If, in addition, one recognizes that the lesion may be mimicked in whole or in part by other less specific processes and that the evidence for its actual existence is tenuous at best, there seems little justification for permitting the whole case for thromboangiitis obliterans to rest entirely on this lesion.

Skepticism concerning the identity of thromboangiitis obliterans has been expressed by numerous investigators. Retention of thromboangiitis as an entity has been urged by other investigators because, in their opinion, the diagnosis of Buerger's disease describes a characteristic and recognizable clinical picture. Such findings, however, do not define a disease. Still others persist in the belief that thromboangiitis obliterans exists because the symptoms and signs respond to specific therapy. Yet, there is no evidence from controlled clinical trials that any therapy, including abstinence from tobacco, is more beneficial to patients said to have Buerger's disease than to patients of similar age with established forms of peripheral arterial insufficiency of comparable severity.

Finally, some observers insist that the existence of an acute pathognomonic vascular lesion justifies acceptance of thromboangiitis obliterans as an entity. These same observers explain the paucity of specific arterial lesions on the fact that the disease is no longer as common as it once was. As indicated above, the specificity of the acute vascular lesion has never been established, and the data provided by Buerger's own photomicrographs lend no credence to the belief that the disease was seen more commonly before than after World War II.

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In seeking absolute truth we aim at the unattainable, and must be content with broken portions. — Osler

Eliminate Powder in the Operating Room

Warren H. Cole MD, Chicago, Ill. Editorial: Eliminate Powdering Hands and Packing Linens in the Operating Room, Ann Surg 153:161-162, February 1961.

For decades surgeons have powdered their hands in the operating room after scrubbing for operation, so that gloves could be put on with minimal effort. Talcum powder was used originally, but has been supplanted by starch because the former is irritating to tissue, causing granulomata.

Observation has shown us that this procedure of applying powder to the hands is dangerous because during application to the hands it diffuses into the air, settles down to the floor, becomes contaminated with bacteria, is agitated into the air by personnel walking about the room, and then settles onto the instruments, operating table, and wound with resultant wound contamination. Lint from sorting and packing "linens," and from clothing is probably as dangerous as powder because it is also extremely light and sifts readily in all directions by air currents produced by activity of operating room personnel and the ventilating system.

It is our contention that both of these dangers can and should be eliminated. In a few European operating rooms, the floor is kept very moist so that any "dust" settling on the floor will adhere. However, this procedure is a bit "sloppy;" so is putting on gloves in a basin of water.

We are adopting a method which avoids the powder menace; experiments with soaps and other liquid lubricants are being carried out. Several have been used to date and each is equally effective, although the correct concentration must be achieved; with a little experience, the proper amount can be applied. If desired, a given amount of the lubricant could be put into a small packet—as the starch is—and applied after opening the packet. Various oils would be effective, but it is difficult to get them off the gloves.

Regardless as to which lubricant is used, it must contain a suitable antiseptic. We have used lubricants containing a suitable antiseptic agent, leaving gloves on for 6 to 8 hours with no ill effects other than slight "wrinkling" of the skin of the fingers; this is a reaction to the sweat which naturally accumulates in varying quantity when the glove is worn for hours.

At present we are experimenting with several soaps or emulsions. We have worn gloves for 4 to 8 hours lubricated with each agent and have observed no irritating effect on the skin. Preliminary bacteriologic studies indicate that 1% hexachlorophene in the lubricants may be adequate to control bacterial growth in the glove after being worn in the operating room. More data is being obtained, including studies on the effect of such products on wound healing because holes in the gloves would allow the escape of a small portion of the lubricant into the wound.

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Perforated Duodenal Ulcer

COL Warner F. Bowers MC USA, et al, Department of Surgery, Tripler U. S. Army Hospital, APO 438, San Francisco, Calif. Arch Surg 82:293-297, February 1961.

There are three possible types of therapy for the acutely perforated duodenal ulcer: simple operative closure, emergency gastric resection, and nonoperative management. Review of the literature for the past decade shows an increasing note of pessimism regarding the time-honored simple operative closure, primarily because of the mortality rate which still remains near 25% in many recent series. Secondarily, dissatisfaction is based on the fact that about a third of the patients come to gastric resection later. This is used as an argument in favor of routine emergency gastric resection. In most reports, nonoperative management is reserved for patients who refuse surgery, those who are too ill to survive any operative procedure, or those who suffered their perforation many hours before hospitalization and are improving at the time they are first seen. This means, in actuality, that the nonoperative management never is a deliberate choice, but represents what is left after other forms of treatment are eliminated. We consider this to be somewhat unfair to the conservative regimen which, in our hands, is usually the method of choice. Review of our experience between January 1950 and August 1959 reveals 62 perforations in 61 patients.

Operative Treatment Group. Of the 42 patients in this group, 41 had simple closure of the perforation, and one had immediate subtotal gastric resection. All perforations occurred in the duodenum. The complication rate was 9.5% in the group surgically treated; no deaths occurred. In the past 3 years, emergency surgery has been performed on only one patient.

Nonoperative Treatment Group. Twenty patients had perforated peptic ulcers treated without surgery using nasogastric suction for an average of 4.7 days. There was one complication (5%); this patient developed pneumonia which responded rapidly to treatment with antibiotics. Seven patients (35%) had subsequent elective subtotal gastric resection at intervals varying from 2 weeks to several months following their perforation.

Comments. The question of what constitutes the best treatment for perforated peptic ulcer remains a source of considerable disagreement among surgeons. In our opinion, emergency gastric resection is needlessly radical because in most series not more than one-third of patients with perforation ever subsequently come to gastric resection. Surgeons in good conscience cannot make a recommendation for routine gastric resection until physiologic results of gastric resection are better than at present.

Nonoperative management is not a new concept; it was first pointed out by Wangensteen in 1934. In all subsequent reports of nonoperative management, mortality figures have equaled or improved upon those from the series treated operatively. Parenthetically, it may be pointed out that from the nonacademic viewpoint of patient welfare it makes no real difference since

we treat acute pancreatitis and acute cholecystitis in the same nonoperative way with success.

It has been a common observation that the perforation frequently is sealed at the time of simple closure. The rapidity with which a leak may be closed has been well demonstrated. If the perforation seals early, spontaneously, and is found closed at operation, surgery was meddlesome. Surgeons agree that patients seen late should not be operated upon. Why should the patient pay the penalty of operation simply because he has the misfortune to see the doctor early?

Cultures from the peritoneal cavity of patients with perforated ulcer usually have been shown to be sterile up to 6 hours after perforation. If leak can be stopped before this time by keeping the stomach empty by gastric suction, there is no bacterial problem. Bacterial peritonitis is not an operative problem, anyway. More recently, it has been found that the spilled gastric acid is neutralized in the peritoneal cavity within 20 minutes; after an hour the fluid actually is slightly alkaline. Control of leakage by nasogastric suction, then, will obviate chemical peritonitis of any consequence. If these various observations are valid, nonoperative management is on firmer basis than surgical closure.

Several authors have pointed out that when one employs nonoperative treatment, close observation of the patient during the initial 24 to 48 hours is an absolute essential. It is during the early hours of care that one must proceed with a surgical attack if nonoperative treatment is ineffective.

Treatment Regimen. Our method of treatment does not differ radically from that of Seeley (Postgrad Med 10: 359, 1951) except that we have not found it necessary to use special electrolyte solutions; we have maintained good electrolyte balance through use of isotonic saline and 5% glucose water with KCl added when needed. In addition, we have not resorted to routine use of antibiotics, having used them in less than half the cases and only on specific indications.

The suggestion has been made that nonoperative management may be less successful or more fraught with complications in treatment of perforation in patients with a chronic ulcer history. In our experience this has not been the case. There appears to be a tendency, however, for older patients to require a slightly longer period of intubation regardless of their previous history.

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Primary Carcinoma of the Gallbladder

Paul H. Gerst MD, Department of Surgery, College of Physicians and Surgeons, Columbia University, New York, N.Y. Ann Surg 153: 369-372, March 1961.

Despite recent advances in medical knowledge and surgical technics, little progress has been made in the clinical diagnosis and surgical treatment of

primary carcinoma of the gallbladder. The present report comprises a review and analysis of all cases of primary carcinoma of the gallbladder documented at operation over the 30-year period, 1930 through 1959.

Primary carcinoma of the gallbladder was found in 132 patients. This represented 0.018% of adult hospital admissions, and 1.8% of all patients whose gallbladders were removed or biopsied during this time. The disease appeared most commonly in individuals between 50 and 70 years of age; the ratio between women and men was three and one-half to one, a figure which corresponds with estimates of the relative incidence of cholelithiasis in the two sexes in the general population.

The clinical picture presented by patients with this condition was similar to that associated with benign biliary tract disease. The three most common complaints were pain, jaundice, and recent weight loss. Constant right upper quadrant or epigastric pain was the most frequent symptom, occurring in over 75% of cases. Persistent jaundice and progressive weight loss became obvious at some time in the preoperative period in approximately one-half the cases. Anemia, inflammatory complications, and intestinal obstruction appeared frequently in patients in whom the disease was further advanced.

In general, the patients with carcinoma of the gallbladder were found to fall into three categories: (1) symptoms of short duration—less than six months (70%); (2) long history of biliary tract disease with severe acute exacerbation a short period prior to surgery (25%); (3) symptoms for many years without change, carcinoma unsuspected (5%).

Of the original 132 patients, 124 were followed adequately; 5 are still alive and apparently disease-free, having survived for periods between 4 and 23 years. Two others survived more than 5 years following operation and died of unrelated causes. In none of these had carcinoma been suspected prior to operation and the tumor was thought to have been completely removed at the time of operation. In 15 others, the tumor was likewise thought to have been completely removed, but survival was less than 5 years. In 96 of the 132 undergoing surgery, resection was impossible.

This very low rate of cure with surgical treatment of carcinoma of the gallbladder reflects our inability to make the diagnosis in time to permit adequate excision of the tumor. Except in the rare case where an early localized tumor is accidentally found at operation, surgery appears to have little to offer as an effective curative procedure. Since present day therapy for this disease is generally inadequate if instituted after the diagnosis can be established, it is appropriate to consider prophylactic measures. The high incidence of cholelithiasis in patients with gallbladder carcinoma is striking and, although the specific relationship between the two conditions remains to be clarified, the association appears to be significant.

Carcinoma, however, is not the only serious risk associated with gallstones. Other complications such as acute cholecystitis, common duct obstruction, cholangitis, and pancreatitis also occur. Morbidity and mortality from all these complications of cholelithiasis would be markedly reduced if elective cholecystectomy were more frequently undertaken in good risk

patients found to have biliary tract calculi. When consideration is given to the total risk which the patient with gallstones faces, and comparison is made with the present risk of elective cholecystectomy (0.35% mortality in our experience during the years 1955 - 1959), early removal of the diseased gallbladder in an otherwise healthy individual with cholelithiasis appears to be justified.

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IN MEMORIAM

O'Brien, Daniel J. CDR MSC USN (Ret) Washington, D. C.	20 February 1961
Benjamin, Mary R. LCDR NC USN (Ret) USAF Hospital, Orlando, Fla.	26 February 1961
Dollard, Henry L. CAPT MC USN (Ret) La Jolla, Calif.	28 February 1961
Pritchett, Charles H. LT MSC USN (Ret) Queens Hospital, Honolulu, Hawaii	3 March 1961
Dilburn, John H. CWO HC USN (Ret) Westend Baptist Hospital, Birmingham, Ala.	5 March 1961
Davis, Walter N. LTJG USN (Ret) U.S. Naval Hospital, Philadelphia, Pa.	23 March 1961
Herndon, James A. CWO MSC USN (Ret) Columbia, S. C.	30 March 1961
Mc Curdy, Jack C. CAPT MC USN Belle Chasse, La.	6 April 1961
Clark, Benjamin W. CAPT MC USN Foster Memorial Hospital, Ventura, Calif.	15 April 1961

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MISCELLANY

Doctor Howard T. Karsner Receives Conrad Award

The fifth annual presentation of the Captain Robert Dexter Conrad Award was made to Howard T. Karsner MD LLD, Medical Research Advisor to the Surgeon General of the Navy, Bureau of Medicine and Surgery, 18 April 1961. The medal and citation were presented to Dr. Karsner at the banquet session of the Fifth Navy Science Symposium sponsored by the Office of Naval Research and held at the Naval Academy, Annapolis, Md. Admiral Arleigh Burke, Chief of Naval Operations, was the principal speaker of the evening.

The award, established by the Secretary of the Navy, is made in recognition of outstanding achievements in research and development for the Navy. It is named for the late Captain Robert Dexter Conrad USN who, as first head of the Planning Division of ONR, was primary architect of the Navy's basic research program.

Dr. Karsner was chosen as recipient of the 1961 Conrad Award for his broad contributions to the research program of the Bureau of Medicine and Surgery. As Research Advisor to the Surgeon General since 1949, he has made a major contribution to development of research programs in submarine and aviation medicine, as well as to establishment of clinical Naval research facilities all over the world.

The first Conrad Award was made in 1957 to Dr. Alan T. Waterman, Director of the National Science Foundation. Subsequent awards have been made to Dr. Charles C. Lauritsen, Professor of Physics, California Institute of Technology; Dr. Robert M. Page, Director of Research, U. S. Naval Research Laboratory; and Dr. Ralph E. Gibson, Director, Applied Physics Laboratory of the Johns Hopkins University.

In the field of submarine medicine, Dr. Karsner has been particularly active in stimulating and promoting studies on the problems of closed environments. His influence has extended into the fields of high-pressure oxygen toxicity and nitrogen narcosis, particularly in development of fundamental concepts essential to safe diving.

His work in aviation medicine has been concerned principally with the physiology and pathology of conditions that contribute to pilot failure. He has promoted studies on physiologic data, such as that involved in acceleration stress, and has supported and guided development of a medical program at the Aviation Medical Acceleration Laboratory, Johnsville, Pa., the Air Crew Equipment Laboratory, Philadelphia, Pa., and the School of Aviation Medicine, Pensacola, Fla.

In recognition of his contributions in the fields of submarine and aviation medicine, Dr. Karsner has been elected an honorary submariner and an honorary naval flight surgeon.

Dr. Karsner has been a leader in establishment of such clinical research facilities within Naval hospitals as the Clinical Investigation Center at the U. S. Naval Hospital, Oakland, Calif. He has also guided development of the Navy's program on clinical evaluation of preserved blood at the U. S. Naval Hospital, Chelsea, which has demonstrated the medical advantages of stored red blood cells in caring for military casualties. He also participated actively in development of the cardio-pulmonary laboratory in the Naval Hospitals at Portsmouth, Va., and St. Albans, N. Y.

Dr. Karsner's interest in developing medical information on exotic and tropical diseases aided in establishment of Naval Medical Research Units in Taipei, Taiwan, and in Cairo, United Arab Republic. He has also been influential in both establishment of a sub-laboratory at Malakal in the Sudan and reestablishment of the Navy Medical Research Unit in the Gorgas Memorial Laboratory in Panama.

The experience and imagination of Dr. Karsner's many years devoted to research have been felt in a number of other areas. One was in development of the human calorimeter which has contributed directly to the Navy's capacity for medical investigation in the field of bio-astronautics. Others included studies of the problems of manpower utilization and prevention and

handling of psychiatric casualties. Other studies on stress from environmental extremes have resulted in operational controls that show a ten-fold reduction of heat casualties during U.S. Marine Corps recruit training periods.

Dr. Karsner has been the recipient of a large number of honors, awards, and citations, and has served in many capacities in both civilian and military societies and committees. He is the author of several books and monographs and of numerous technical articles and papers in the medical field.

The citation, signed by the Secretary of the Navy, reads in part: " . . . You have brought your wisdom and broad experiences to bear on the needs of medical research in the Navy. Your sound judgment has been invaluable in recognizing and determining the areas of research of greatest importance. . . . At the same time you have never overlooked the utility of existing fundamental knowledge as applied to present Navy problems. . . . The policies adopted with your support have established Navy medical research on a high level which will continue to constitute a firm basis for increasingly strong development far into the future."

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Ninth Kimbrough Urological Seminar

The 9th Annual James C. Kimbrough Urological Seminar is to be conducted at Brooke General Hospital, Brooke Army Medical Center, Fort Sam Houston, Texas, 6 - 8 November 1961. This Army sponsored postgraduate professional short course offers an unusual opportunity to military medical officers for interchange of ideas and dissemination of concepts of scientific urologic progress for the preceding year, and is designed primarily for advancement of military urology. In accordance with availability of travel funds it will be necessary to limit the number of urologists and urology residents who can be issued TAD orders to attend this seminar. Officers desiring to attend should submit a written request to the Bureau via their Commanding Officer by 15 September 1961.

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BUMED INSTRUCTION 6230.11A 8 April 1961

Subj: Malaria; control and prevention

Malaria has seriously interfered with military operations in the past and can do so again. Military malaria control and prevention depend on mosquito control, protective measures, and chemoprophylaxis. Because Naval operating forces may be required to deploy component units on short notice to any place in the world, it is necessary that components subject to deployment to malarious areas be prepared to institute chemoprophylactic and other preventive measures. This directive outlines measures to be taken and lists references to be followed in achieving this purpose.

From the Note Book

Thailand Physicians Visit Sasebo Hospital. Two Thailand physicians, sponsored by their government under the Colombo Plan, Council for Technical Cooperation in South East Asia, recently visited Japanese public health officials. They were making studies and surveys, particularly in the field of venereal disease control. The director of the city of Sasebo Public Health Department requested the assistance of CAPT W. D. Tucker, Head, Medical Department of the Naval Station at Sasebo in indoctrination of the visitors in this particular field. Arrangements were made for the Thailand visitors and a group of Japanese physicians to visit the Station Hospital where they were given extensive explanations of the U. S. Navy's venereal disease control program, including contact interviewing, teaching technics, educational methods, and training aids. A sample training film was shown with a question and discussion period following under the direction of CMSW-4 D. E. Sabin, Sanitation Officer.

Nuclear Nursing Orientation. A 2-week course in Nuclear Nursing Orientation was recently conducted by the Nuclear Nursing Division of the U. S. Naval Medical School, NNMC, Bethesda, Md., under the direction of Nurse Corps Officers, LCDRs Lenore Simon and Sarah McGinniss. Reflecting advances resulting from nuclear technologic research the course was aimed toward training in nursing technics and radiologic health safety practices associated with care of patients receiving radioactive substances. The course was attended by 23 military nurses—representing the Army, Navy, and Air Force—and 3 civilian nurses. (PIO, NNMC)

Naval Academy Booklet. Facts of Life in the Brigade of Midshipmen (a booklet prepared by the Mental Hygiene Unit of the Medical Department at the Academy) has recently been made available through the Naval Academy Section, BuPers, or the Superintendent's Office at the Academy. By clever cartoons and terse text, the booklet—intended for distribution to prospective candidates seeking information concerning admission—seeks to dispel glamorous illusions and possible misconceptions young men may have formed concerning the purpose of and life at the Naval Academy.

Poliovirus Vaccines. Because adequate supply of oral poliovirus vaccine is not expected before 1962, the continued use of the Salk (killed-virus) vaccine should be vigorously promoted by health agencies and physicians, so that as many people as possible below the age of 50 will be protected by the full series of four injections. According to the U. S. Public Health Service, the incidence of paralytic polio is now highest among "babies and bread-winners" in low-income families—indicating where the greatest effort to encourage use of Salk vaccine is needed. PHS figures show that in the U. S. as a whole during 1959, paralytic polio was prevented in about 95% of those who received four injections. (The Medical Letter on Drugs and Therapeutics, February 17, 1961)

Influenza. Two more areas have now reported influenza A_2 activity; New York State was the first to report a few weeks ago. Cases in Stamford and at Yale University (New Haven) in Connecticut, and Andrews Air Force Base in the Washington, D. C. vicinity are the latest areas of identified activity of the virus. However, the number of deaths due to influenza and pneumonia remain within normal seasonal limits for the nation. (Morbidity and Mortality, PHS, DHEW, April 21, 1961)

Topical Triclobisonium Chloride. Prolonged use of topical antibiotics and chemotherapeutic agents has been reported to result frequently in either a resistant organism or a sensitized host. The authors investigated triclobisonium ointment or aqueous solution and concluded the agent is more effective than any presently used topical antibacterial drug. They observed a low sensitizing rate. (S. Hanfling and H. Goldberg, Antibiot Med, January 1961)

Salicylate Absorption. From studies on dogs the authors observed that aspirin is poorly absorbed through the rectal mucosa and that prolonged rectal administration of the drug may be potentially hazardous. They concluded that additional studies should be made to evaluate the extent of irritation and ulcerative hemorrhagic lesions that may occur in the human rectum following repeated administrations of aspirin suppositories. (A. Morgan, et al, Amer J Dig Dis, January 1961)

Evaluation of Furaltadone (Altafur). As part of the continued search for new chemotherapeutic agents the authors report from London that, when used with a variety of infections in surgical patients, furaltadone (Altafur) would seem to be a valuable addition to, and compare favorably with, the established chemotherapeutic agents. The drug was of little value in infections caused by Proteus and Ps. pyocyanea, however. (J. I. Burn and S. J. Coleman, Antibiot Med, January 1961)

Meprobamate in Angina Pectoris. A double blind study was made comparing the effectiveness of pentaerythritol tetranitrate (PETN) alone, with the effectiveness of the drug combined with meprobamate in patients with angina pectoris. A majority of the patients reported a good response to both drugs. Clinical results and results of the Master two-step tests showed such slight differences between the two medications as to be insignificant. (J. Edson, et al, Amer J Med Sci, January 1961)

The ECG and Position of the Heart. After comparing the ECG and anatomic orientation of the heart by selective, biplane angiocardiography, the authors observed that no correlation could be demonstrated between the electric axis and anatomic position. The electric variations are greater than can possibly be explained by known rotations of the heart about any anatomic axis. They concluded that the electric positions of the heart should be abandoned in favor of direct description in three dimensions of the orientation of the mean electromotive force of the heart. (W. Guntheroth, et al, Circulation, January 1961)

Mass Screening for Glaucoma. The author describes a technic and organization of mass screening for glaucoma in 10,000 factory employees in Bonn, Germany. The incidence of simple glaucoma (including 2 patients with pigmentary glaucoma) after the age of 40 years was 2.3%—corresponding closely to the frequency found in the U.S. (W. Leydhecker, Amer J Ophthal, February 1961)

Intrathoracic Pheochromocytoma. The authors present an additional case report of intrathoracic pheochromocytoma to the 12 previously reported cases. This case emphasizes that the tumor may occur in the thorax, usually along the sympathetic trunk in the paravertebral region. Radiologic examination may reveal the location and guide the surgeon in his operative approach. (W. Green and F. Bassett, Amer J Clin Path, February 1961)

Effects of Cortisone on Healing. In relation to evaluation of the concept of increased strength in disrupted resutured wounds compared to primary wounds, the authors observed that cortisone significantly decreased the strength of such wounds in rabbits. The decrease in strength of the wound appeared to be directly related to the length of time of cortisone administration. The basic concept that disrupted wounds heal with greater strength was confirmed. (D. Hinshaw, et al, Amer J Surg, February 1961)

Cancer of the Colon. Based on observations at the Sklifosovsky Institute, Moscow, the author concludes that the immediate and long term prognosis for colon cancer treated with radical resection is better than that following similar operations for cancer of the stomach and more especially of the esophagus. He believes that improvements in methods for timely diagnosis of colon cancer have fallen far behind the considerable achievements in the operative treatment of this malignancy. Furthermore, roentgenography of the colon and sigmoidoscopy should be used more often in examination of patients. (B.A. Petrov, Amer J Surg, February 1961)

Gastroduodenal Perforation. The authors focus attention upon certain facts and results that should call for a reconsideration of old and fixed attitudes and for a new appraisal in surgical management of gastroduodenal perforation, specifically the acceptance of a more liberal use of primary gastrectomy. They consider that their work has demonstrated beyond doubt that emergency gastrectomy can be used successfully, resting on many considerations—the patient, gravity and complexity of the disease, total surgical competence available, et cetera. (A. Maynard and A. Prigot, Ann Surg, February 1961)

Plastic Film Dressing. A plastic dressing for wounds has many advantages for patients in a general surgical practice. The spray provides a clear film over the wound which is free from complications. (J. Miller, et al, Arch Surg, February 1961)

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DENTAL SECTION

New Oral Surface Anesthetic

Irwin I. Ship, et al, National Institute of Dental Research, Bethesda 14, Md. Development and Clinical Investigation of a New Oral Surface Anesthetic for Acute and Chronic Oral Lesions. Oral Surg 13: 630-636, May 1960; abstracted in Dental Abstracts, January 1961.

Various concentrations of 4 antihistamine compounds and dyclonine hydrochloride were prepared in isotonic sodium chloride solutions for initial screening purposes. Fifteen patients with severe recurrent aphthous stomatitis were studied for 6 months. Because of the random nature of the treatment sequence, not every patient received each drug. Analysis of results indicated excellent depth of anesthesia with lidocaine hydrochloride and dyclonine hydrochloride; inadequate anesthesia resulted when diphenhydramine hydrochloride was used.

Because results suggested that a combination of the pharmacologic effects of dyclonine and diphenhydramine would be desirable, an isotonic sodium chloride solution containing 0.5% diphenhydramine hydrochloride and 0.5% dyclonine hydrochloride was studied for anesthetic potency and duration in 45 patients with painful oral lesions. The patients were observed for periods ranging from 7 to 540 days.

Onset of effective anesthesia occurred within 3 to 7 minutes after application of the anesthetic solution to the lesions, or after use of the solution as a mouthwash. Depth of anesthesia ranged from excellent to poor; occasionally, it was found to be excessive. Duration of effective pain relief was about one hour. One patient, a 35-year old woman who later reported having experienced an allergic reaction to antihistamines taken previously in "cold tablets," developed acute swelling of both lips associated with multiple severe ulcerations, malaise, fever, and headache. The symptoms spontaneously disappeared within 24 hours after withdrawal of the medication. Five other patients reported sensations of dryness of the mouth, and 3 patients reported excessive salivation.

An isotonic sodium chloride solution, containing 0.5% diphenhydramine and 0.5% dyclonine, gave adequate to excellent relief from pain for the majority of 45 patients with painful oral lesions. These patients either administered the solution directly to the oral lesions with cotton-tipped applicators or used the solution as a mouth wash.

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Cancer Diagnosis for the General Practitioner

L. Eckmann, Chirurgische Klinik, Burgerspital, Basel, Switzerland. CIBA Symp. 7:270-274, February 1960; abstracted in Dental Abstracts, January 1961.

In almost all countries of the world, a frightening increase in the incidence of carcinoma of the oral cavity and the upper respiratory tract has been observed. Twenty-five years ago this type of cancer occurred once in every 15 instances of malignancy, whereas today it is responsible for one instance in every 5. In men, it is the most common form of cancer. In women, however, the incidence is about seven times smaller, but it is gradually increasing.

Squamous cell carcinoma is encountered almost exclusively in heavy cigarette smokers; this phenomenon has led to an association of cause and effect. Chronic bronchitis caused by heavy smoking may facilitate cancer formation even after several years have elapsed. Although squamous cell carcinoma can be justly regarded as the smoker's form of cancer, it only accounts for about one-half of the total number of instances of oral and bronchial cancers. There exist almost as many undifferentiated small cell carcinomas; about 10% of these malignant tumors are adenocarcinomas for which smoking cannot be made responsible.

In taking the patient's history, special attention should be paid to the early symptoms such as chronic cough, mild dyspnea (even during rest), increased salivation (especially in smokers), and expectoration of blood; pain is an infrequent complaint. Suspicious signs are obstinate catarrh and recurrent pulmonary infiltration. Extreme hoarseness indicates an involvement of the recurrent laryngeal nerve.

The methods of investigation required if these symptoms are mentioned should begin with a thorough roentgenographic examination of the involved and adjacent regions. Roentgenographic examination, however, is often insufficient because comparatively small tumors may be hidden beneath perfectly healthy tissues. In an effort to diagnose the presence of a malignant tumor of the oral cavity or the upper respiratory tract at an early stage before complications set in, the usual roentgenograms should be supplemented by lateral exposures with hard roentgen rays. This will facilitate the differentiation of normal and pathologic shadows and help in detection of signs of translucency, erosion, or displacement of respiratory passages. In all instances in which suspicious findings are made, use of tomography is indicated. Suspect tissues should be examined by means of biopsy. A method producing positive findings in a far higher proportion than biopsy is that of cytologic examination.

It is seldom possible for a dentist or physician—whether a general practitioner or a specialist—to carry out all investigations necessary to diagnose the presence of a malignant tumor at an early stage. As a rule, therefore, the patient should be referred to a large hospital. The general practitioner, however, can supervise the investigation program he considers necessary,

provided he keeps in close touch with the various specialists furnishing the diagnostic aids. It is, of course, of specific significance not to overlook any symptom pointing to possible malignant cancer during the first examination. The patient's expectation of life, in the vast majority of instances, lies in the hands of the general practitioner whether a dentist or a physician.

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Public Discussion and Publication of Articles

The Bureau of Medicine and Surgery in recognizing the great importance of disseminating information gained from medical research, testing, and development, heartily encourages not only wide distribution of reports via official channels to other interested Government activities, but also presentation of appropriate reports through public media such as lecture, discussion, or publication, whenever security and/or established policy are not breached. Therefore, in accordance with Manual of the Medical Department, Chapter 1, Article 19, all reports destined for distribution to or by public media must be cleared and approved for release by the commanding officer of the unit from which they emanate. All persons, including civilian and military attached to the Bureau of Medicine and Surgery managed laboratories and research facilities, shall sign such articles and attach the disclaimer statement of Article 1252.3 of Navy Regulations.

A similar procedure applies to speeches and public discussions, in which cases the individual shall inform his listeners of his unofficial status. Where doubt exists, manuscripts—classified or unclassified—may be submitted to the Bureau for clearance or review prior to publication. As soon as practicable after publication of an article, military authors from research facilities shall submit three reprints (not manuscripts) of the article, via official channels, to the Chief, Bureau of Medicine and Surgery; all other authors (civilians from BuMed managed activities, and other military authors) shall submit two reprints. The Bureau will forward one copy of each reprint by a military author to the Secretary of the Navy; one copy will be retained in the files of the Bureau; a third copy (when applicable) will be retained by the Research Division.

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Dental Operating Units. All stocks of FSN 6520-542-1475, Dental Operating Unit, Senior Model, as manufactured by the Ritter Dental Manufacturing Co., Inc., have been exhausted. All future requisitions for this item should indicate the manufacturer (SS White or Weber) if a preference exists.

Location of the plumbing and height and physical makeup of the SS White Unit anchor plate prevents adaptation to installation on the plumbing arrangement for the Ritter Unit. However, adaptation of Weber Units to the plumbing designed for use of Ritter Units is considered practical. Procedure

to effect this adaptation has been developed at the Naval Dental School, National Naval Medical Center, Bethesda, Md. Copies may be obtained from Chief, Field Branch, Bureau of Medicine and Surgery, 29th Street and 3rd Avenue, Brooklyn 32, N. Y. (Attn: Code 42B). In all instances involving replacement of a Ritter Unit installed on a concrete or steel deck, it is recommended that activities utilize a Weber Unit.

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Dental Standards for Women and Prep School

The Manual of the Medical Department, Chapter 6, Article 94, is quoted for information on the dental standards for women:

> To be accepted for original enlistment, an applicant must have at least 20 teeth. Satisfactory artificial replacements may be counted in lieu of natural teeth. An applicant must have no more than five carious teeth as determined by the Type 4 screening examination described in Article 6-100(1). Dental examinations may be performed by personnel at Navy and Marine Corps recruiting stations.

Prior to transferring personnel to the Naval Academy Preparatory School, U. S. Naval Training Center, Bainbridge, Md., the provisions of Chapter 6, Article 89 (MMD) must be adhered to. This article states that, "except for minor or questionable carious areas, all required dental treatment must be completed."

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90 PKV Dental X-Ray Apparatus

The Armed Services Medical Materiel Coordination Committee has adopted as a standard item a 90 PKV Dental X-ray Apparatus to provide an up-to-date x-ray unit for use at dental activities. This unit has a maximum output of 15 MA at 90 PKV and is equipped with an electronic timer with a minimum timing range of 1/30 sec to 5 sec.

Stock No.	Item Description	Approx Cost
FSN6525-721-9867	X-Ray Apparatus, Dental, Floor Mounted, 15 MA, 90 PKV, 100-130 Volts, 60 Cycle, AC	$1095.00

Bids for this item were let in March; the unit should be available in August 1961. Activities contemplating replacement of their present x-ray apparatus should, where practical, withhold procurement action pending availability of the new equipment.

Newly Standardized Dental Items

STOCK NUMBER	ITEM IDENTIFICATION	UNIT	PRICE
FSN6520-687-8457	BUR, DENTAL EXCAVATING, Angle Handpiece, Tungsten Carbide, #35, Short Neck, Inverted Cone	Each	$0.43
FSN6520-720-9310	BUR, DENTAL EXCAVATING, Angle Handpiece, Tungsten Carbide, #558, Short Neck, Crosscut Fissure	Each	.45
FSN6520-720-9312	BUR, DENTAL EXCAVATING, Angle Handpiece, Tungsten Carbide, #4, Short Neck, Round	Each	.43

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Personnel and Professional Notes

Navy DOs at IADR Meeting. The 39th General Meeting of the International Association for Dental Research met at Boston, Mass., 23 - 26 March 1961. Rear Admiral C. W. Schantz, Assistant Chief of the Bureau of Medicine and Surgery (Dentistry) and Chief, Dental Division, was in attendance as the representative of the Bureau. Dental personnel participating in the meetings and subjects discussed were:

Capt W. R. Stanmeyer—Non-Specific Stress and Cariogenic Activity

Capt C. A. Ostrom—Interruptions of Oral Ecology Related to Caries in the NMRI-D Rat

Capt R. B. Wolcott—Clinical Aspects of Infra-Red Studies of Saliva and Dental Plaque

Capt A. G. Nielsen—Facial Protective Devices for Personnel Wintering-Over in Antarctica

Cdr L. W. Wachtel (MSC)—In Vitro Evaluation of Protection by F^- and Sn^{++} Following Topical Application to Human Teeth

Cdr M. A. Mazzarella—Physical Variations and pH Values of Saliva

Cdr G. H. Rovelstad—Histochemical Characteristics of Salivary Corpuscles

Cdr P. J. Boyne—Histologic Study of Alveolar Bone Repair Utilizing Tetracycline Induced Fluorescence

LCdr N. C. Demaree—Properties of Dental Amalgam Made from Spherical Particles

Lt W. R. Shiller—Morphological Differences in Teeth of Caries Susceptible and Caries Immune Males

Dr R. R. Van Reen (NMRI)—The Influences of Phosphates and Molybdate on Dental Caries in the NMRI-Rat

Dr B. L. Lamberts (Great Lakes)—Studies of pH Changes and Infra-Red Absorbance of Parotid Secretion

Dr I. L. Shklair (Great Lakes)—Bacterial Inhibition of Parotid Secretion

Dr H. Wolochow (NMRU-1)—The Inhibition of Coliphage T_1 by Oral Secretions

Mr L. R. Brown (NDS)—The Effects on InVitro Caries of the Diffusion of Tryptophane, Niacin, Pantothenate, and Folic Acid Through Human Teeth

Mr T. S. Meyer (Great Lakes)—Spectroscopic Studies on Human Saliva

In addition, Cdr Rovelstad was Presiding Officer of the Clinical Studies Section and Dr Van Reen was Presiding Officer of the Nutrition Section. Other Dental officers attending the meeting were: Capts S. T. Kasper, W. E. Ludwick, Leonard Kraske, G. W. Ferguson, Francis P. Scola, Robert Middleton, Harvey W. Lyon, and L. S. Hansen; and LT John S. Lindsay.

Second Year Oral Surgery Residency Approved. The Council on Dental Education, ADA, upon recommendation of the Council's Committee on Internships and Residencies, has approved the Oral Surgery Residency (2nd year level) program being conducted at the U. S. Naval Dental School, NNMC, under the command of CAPT Arthur R. Frechette DC USN.

Representatives at Dental Schools Meeting. The American Association of Dental Schools held its 38th Annual Session, 26 - 29 March 1961, in Boston, Mass., following the IADR meeting. Among Affiliate Member Organizations represented were the Dental Division of BuMed and the U. S. Naval Dental School. Representing the former were: RADM C. W. Schantz, Assistant Chief of the Bureau and Chief, Dental Division; and CAPT W. R. Stanmeyer, Head, Professional and Research Branches. The School was represented by CAPT A. R. Frechette, the Commanding Officer. Also attending from the Dental School were CAPTs W. A. Newman, G. W. Ferguson, and H. J. Towle Jr.

CAPT Nutting Presents Clinic. CAPT Edwin B. Nutting DC USN, on duty at MCRD, San Diego, Calif., presented a projected clinic, Utilization of Endodontically Treated Teeth as Abutments for Fixed and Removable Partial Prosthesis, at the annual meeting of the American Association of Endodontics in Chicago, Ill.

In addition, at the 1961 Midwinter Meeting of the Chicago Dental Society, CAPT Nutting, with Dr. Louis I. Grossman of Philadelphia, and Dr. E. James Best of Evanston, Ill,, participated in a panel discussion of the various phases of endodontic treatment.

CAPTs Flocken and Towle at Dickenson University. CAPTs J. E. Flocken and H. J. Towle DC USN, staff members of the U. S. Naval Dental School, presented lectures in conjunction with a course in Casualty Care Training at the Fairleigh Dickenson University School of Dentistry, Teaneck, N. J., in March 1961. During 2 days, CAPT Flocken discussed: Hemorrhage, Chest Wounds, Burns, and Resuscitation; CAPT Towle lectured on Airway Problems, Abdominal Wounds, and Head Wounds.

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RESERVE SECTION

New Participation Requirements

For the past several years, regulations provided for removal from an active status of those officers who were in a promotion zone and failed to earn at least 12 retirement points in the fiscal year preceding the year they entered the zone or during any subsequent year while in the zone.

Commencing 1 July 1961, all officers who fail to earn at least 12 retirement points (exclusive of the 15 gratuitous points) during any anniversary year ending after that date will be removed from an active status if they:

1. Have completed their obligated service (8 years membership in the Armed Forces, if enlisted or appointed on or before 9 August 1955, 6 years membership if enlisted or appointed after that date).
2. Have been commissioned 8 years, if appointed on or before 9 August 1955, or 6 years if commissioned after that date.
3. Have been on inactive duty for 3 years.

This provision is set forth in BUPERS Manual, Article H-3705. (The Naval Reservist, March 1961)

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Questions and Answers

Q. How many Naval Reserve Medical Companies are there and where are they located?

A. There are 47 Naval Reserve Medical Companies distributed throughout the various Naval Districts. First District: (1-1) Boston, Mass. (1-2) Providence, R.I. (1-3) Portland, Me. (1-4) Springfield, Mass. (1-6) Lowell, Mass. Third District: (3-1) New Haven, Conn. (3-2) New York, N. Y. (3-4) St. Albans, N. Y. (3-5) Brooklyn, N. Y. (3-7) Montclair, N. J. (3-8) Hackensack, N. J. Fourth District: (4-1) Pittsburgh, Pa. (4-3) Philadelphia, Pa. (4-4) Philadelphia, Pa. (4-13) Columbus, Ohio (4-16) Cincinnati, Ohio (4-14) Cleveland, Ohio Fifth District: (5-6) Washington, D. C. Sixth District: (6-7) Memphis, Tenn. (6-8) Miami, Fla. (6-10) Atlanta, Ga. (6-15) St. Petersburg, Fla. Eighth District: (8-1) Dallas, Tex. (8-2) New Orleans, La. (8-5) New Orleans, La. Ninth District: (9-1) St. Louis, Mo. (9-3) Indianapolis, Ind. (9-4) Kansas City, Mo. (9-5) Detroit, Mich. (9-6) Des Moines, Iowa (9-7) Duluth, Minn. (9-8) Cedar Rapids, Iowa (9-9) Lincoln, Nebr. (9-14) Minneapolis, Minn. (9-17) Milwaukee, Wis. (9-19) Rochester, Minn. (9-20)

Chicago, Ill. (9-21) Denver, Colo. Eleventh District: (11-1) Los Angeles, Calif. (11-2) Phoenix, Ariz. (11-6) San Diego, Calif. Twelfth District: (12-1) Oakland, Calif. (12-2) San Rafael, Calif. (12-4) Oakland, Calif. (12-5) San Francisco, Calif. (12-6) Berkeley, Calif. Thirteenth District: (13-2) Seattle, Wash.

Q. What pay do members of Naval Reserve Medical Companies receive, if any?

A. Pay billets are authorized for the Commanding Officer and certain staff members under the following conditions: A unit which has an enrolled membership of 15, but not more than 29 members qualifies for pay status for the commanding officer and one staff member. For each additional 15 members, pay status is authorized for one additional staff member. In order for these officers to receive the pay authorized, the unit must maintain a minimum drill attendance of 75%. Not more than 5 pay billets may be authorized for any unit.

Q. What are the promotional benefits to members if they earn 50 retirement points per year?

A. There is no direct relationship between earning 50 retirement points per year (a year of satisfactory Federal service) and selection for promotion. Selection for promotion is effected by a board of officers through a review of records. The fact that 50 retirement points were earned each year is but one of several factors considered by selection boards. However, an officer participating in Reserve activities to the extent of earning 50 retirement points per year enhances his chances for selection for promotion as opposed to an officer who has not actively participated.

Having been selected for promotion, an officer reaps promotional benefits by virtue of having earned 50 retirement points per year because the earning of retirement points also results in the earning of promotion points. For instance, by attending at least 75% of the authorized drills of the unit to which attached an officer will earn 12 promotion points; e.g., by attending 18 of 24 authorized drills he will earn 18 retirement points and 12 promotion points. Also, by completing a correspondence course which earns 12 retirement points, an officer earns an equal number of promotion points. Further, an officer who does not earn 12 promotion points by attendance at 75% of authorized drills of a unit may earn 12 promotion points by performing 14 days' active duty for training. For this training, he would receive 14 retirement points in addition to the 12 promotion points.

Q. Explain the point system.

A. Retirement points may be earned in the following manner:

1. One (1) point for each day of active duty or active duty for training.
2. One (1) point for each authorized drill attended.
3. One (1) point for each period of equivalent instruction or appropriate duty performed.

4. Point credit for completion of authorized correspondence courses. The point credit varies in accordance with the course completed.
5. Fifteen (15) gratuitous points are credited for each year of membership in a Reserve component.

No more than 60 points are allowable annually by methods (b), (c), (d), and (e). There is no limitation, other than the number of days in a year, on the number of points which may be earned by method (a).

The earning of 50 retirement points per year constitutes a year of satisfactory Federal service, 20 years of which is a prerequisite to retirement with pay at the age of 60.

Promotion points may be earned in the following manner:

1. Two (2) points for each month of extended active duty (not including active duty for training).
2. Twelve (12) points for: (a) completion of 14 days of active duty or active duty for training; or (b) attendance at 75% of the drills authorized for the unit or units in which enrolled; or, completion of 75% of the periods of appropriate duty authorized, but in no instance less than 18 drills or periods of appropriate duty.
3. Medical and dental officers enrolled in a course of residency training approved by the Chief of the Bureau of Medicine and Surgery, will, upon their application, be credited with one promotion point for each semester hour or equivalent thereof satisfactorily completed. Not more than 12 promotion points will be credited for one fiscal year. To be creditable, residency training must have been completed in present grade since 1 July 1950.
4. Points as evaluated and assigned for satisfactory completion of approved correspondence courses or Naval Reserve Officer School courses.

An officer selected for promotion must earn 24 promotion points per year in grade, not to exceed a total of 144, in order to be promoted; e.g., an officer selected for promotion to commander who has been a lieutenant commander for 5 years must earn 120 promotion points within a specified period of time in order to be promoted.

Q. What is retirement age? What are the minimum and maximum years of service required for retirement with pay?

A. Any person who has completed 20 years of "satisfactory Federal service" as a commissioned officer, warrant officer, flight, or enlisted person in any of the Armed Services or Reserve components thereof is eligible, upon application, to receive retired pay upon or after reaching age 60. Any member who meets the age and service requirements is eligible. Any former member who met the service requirements prior to separation from the service under honorable conditions is eligible to apply for retirement pay following attainment of age 60.

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OCCUPATIONAL MEDICINE

Recent Welding Practices at Naval Facilities

Charles Bergtholdt, Director, Industrial Health Division, U. S. Naval Weapons Plant, Washington, D. C. Arch Environ Health 2:81-86, March 1961.

Welding and technics such as metalizing allied to welding are convenient and rapid methods of joining and surfacing many common metals. In fundamental principle, nearly all welding processes are identical; i.e., heat, near or above the melting point of the material of one or more of the parts of the joint, is applied or generated at the joint. Then, by a procedure characteristic of the individual process being employed, the heated surfaces are caused to coalesce. The convenience, flexibility, and potentialities of welding, cutting, and the other allied procedures were forcibly demonstrated during World War II in the course of manufacture of virtually every fabricated item from electronic tubes to warships. They also played vital roles in maintenance, alteration, and battle damage control and repairs of naval vessels and equipment. When necessary, cutting and arc welding can be and have been accomplished underwater with good results. Equipment and materials for welding are, therefore, furnished to most of the larger classes of naval vessels for the purpose of normal self-maintenance and damage control, and also for service to other ships in the cases of repair ships, tenders, et cetera.

In view of innumerable variations encountered in fabrication and maintenance jobs in the naval service, it is not possible to prepare any reasonably brief discussion of ways and means of accomplishing various jobs. Operators and supervisors must be able to weigh the factors in a job and devise procedures of maximum effectiveness or estimate the causes and cures of difficulties which are encountered.

The welding field has undergone many changes in the past few years with introduction of new welding methods and modification of existing ones. These developments are currently having a pronounced effect in many aircraft and missile applications. As more is found out about them, their usefulness will increase and make possible the fabrication of many items that today present serious fabrication problems. They are of interest to occupational health personnel because of introduction of new potential health

hazards and probable reduction of some hazards of conventional welding. Elimination of exposure to ultraviolet radiation with associated ozone and oxides of nitrogen is a desirable feature of some of the new technics. It is very important that industrial hygienists work with welding engineers and metallurgists in suggesting health protection measures, especially where exotic metals, toxic materials, and high energy sources such as high frequency, electron beams, and ultrasonics are used.

For convenience, new developments have been grouped under headings encompassing fusion welding, resistance welding, brazing, solid-state bonding, and cutting and coating. Under fusion welding are four new developments—electroslag welding, short-arc and dip-arc welding, electron-beam welding, and arc-spot welding. Under resistance welding, the most prominent are high-frequency welding, foil seam welding, magnetic-force welding, and new process control concepts. In brazing, many new alloys have been developed; new heat services and improved atmospheres are applied much more extensively. In the solid-state bonding field, ultrasonic welding has been developed, as have friction welding and various methods of diffusion bonding. Introduction of the plasma jet as a heat source has supplied a new tool for uses in cutting and coating applications.

Details on Some Methods

Short-Arc and Dip-Arc Welding. These technics promise to introduce a needed safety factor in ship hull repair and fabrication. There are no drops of free-falling metal from the arc in out-of-position welding. Skill requirements are lower than for conventional tungsten inert gas welding, thus reducing the welder's exposure time to welding fumes and ultraviolet-produced oxidant gases, as well as to spatter from hot sparks and molten metal. Little or no postweld cleanup is required, with resultant decrease in noise from chipping and grinding and decrease in the amount of respirable grinding dust dispersed.

Electron-Beam Welding. Electron-beam welders are available with energy potentials ranging from 5 to 150 kilovolts. Parts are joined by bombarding them with a stream of electrons in a vacuum. K and L x-ray photon production takes place and is directly proportional to the atomic number of the target material. Welders and nearby personnel should wear film badges or other suitable monitoring devices. Titanium and beryllium welded by this process have some protection inherent because the welding is done in a vacuum chamber.

Arc-Spot Welding. A disadvantage to the chipper and grinder in postweld cleanup is noted in the arc-spot welding process which leaves an irregular surface. Those arc-spot welding processes which add filler material to the weld, cause metal buildup or a button at the weld. The additional noise, vibration, and dust are not welcomed.

Ultrasonic Welding. Noise measurements should be made of the frequencies above the audible range as well as in the audible range. Ear protection should be considered until safe energy and frequency limits have been established.

Foil Seam Welding. Foil seam

welding has the advantage of good appearance, ease of finishing, and high welding speed. These are all health advantages when one considers the reduction of noise, dust, and oxidant gases on personnel exposure.

Magnetic-Force Welding. This process has the advantage of permitting welding of vinyl-coated steels and other prefinished materials with no damage to the finish due to shallow heat penetration. This is particularly important because of the decomposition products due to heat with conventional metal welding.

Plasma Jet Coating. The plasma jet process has been used for spraying metallic coatings. In one naval establishment, several cases of suspected metal-fume fever resulted from spraying zinc and brass onto propellers for buildup and corrosion protection.

Health Hazards

The following paragraphs recount incidents of potential health hazard exposures due to welding which have appeared in recent releases of "Occupational Health Hazards," published quarterly by the Occupational Health and Dispensary Division, Bureau of Medicine and Surgery, Department of the Navy. These releases are compiled from reports submitted to the Bureau by all naval activities (shipyards, air stations, ordnance plants, supply centers, et cetera) which have industrial hygienists assigned to the medical departments.

1. Since the problem of inadequate ventilation has been repeatedly discussed with regard to its effect on production and health, an industrial hygiene study was made of portable exhaust ventilation installed in ship compartments for control of air contamination from welding and burning. A representative series of air flow measurements was made at the orifices of exhaust ducts in use and it was found that approximately 80% of these met a minimum standard of ventilation for control of the common air contaminants. A Navy standard has placed at 375 cfm for each welder or burner where the exhaust duct is brought within one foot of the torch. The range of values found extended from a minimum of 240 cfm to 1200 cfm for nominal six-inch flexible ducts. Nominal three-inch ducts failed to meet this requirement in all cases. The fact that 20% of the installed ventilation systems were inadequate to control emitted air contamination, and few of the exhaust ducts were brought within one foot of the source of contamination, indicated that ventilation in shipboard welding and burning is a continuing control problem. Efficient exhaust ventilation meeting the above standard not only removes air contaminants at their source but removes a considerable portion of the heat generated, thereby making working conditions generally more comfortable, as well as more healthful.

2. Investigation of welding being done on cadmium-plated pipe legs for shipboard furniture also revealed that about 6,000 cadmium-plated studs are welded to the decks of each carrier to secure furniture, and cadmium-plated locking rods for lockers are sometimes lengthened by welding. Because of the hazard involved, the following measures were instituted: (a) In order to utilize the present stock of cadmium-plated studs, the cadmium

in the way of welding was ground off. Samples taken during the grinding process indicated about 0.25 mg of cadmium per cubic meter of air. Accordingly, the employee doing the grinding was equipped with a metal-fume respirator. (b) Five inch exhaust tubing was used, instead of the three-inch tubing usually provided.

To prevent inadvertent hazardous exposures to cadmium oxide fumes, the following recommendations were: (a) The feasibility of substitution of uncoated or galvanized steel for the cadmium should be investigated. (b) All assemblies requiring welding should be made prior to plating with cadmium, if practicable. (c) Cadmium-plated materials should be clearly identified and marked so that workmen might take proper precautions. (d) Five-inch diameter exhaust ventilation ducts for each welder required to work on cadmium should be utilized. (e) Personnel, as required, should be assigned to assist the welder in necessary manipulation of five-inch ventilation tubing. The intake must be kept as near to the source of fumes as possible, and if necessary, assistance should be furnished the welder so that the ventilation may be continuously effective.

3. Inhalation of toluene diisocyanate vapors from burning out a patch of bulkhead plate backed by foamed-in-place polyurethane plastic caused 21 employees to report for treatment. Concentration of the vapors in the compartment was not determined; however, it was sufficient for the odor to be discernible to the welder and cause irritation of his eyes. Others in the compartment were not aware of any particular discomfort at the time. The three-inch exhaust hose ordinarily used for welding and burning operations was used throughout the operation. The lowest concentration of toluene diisocyanate detectable by odor is 0.4 ppm and odor is appreciable at 0.8 ppm. The threshold limit for continuous work is 0.1 ppm. All persons exposed developed quite similar respiratory symptoms varying only in degree. These included coughing, shortness of breath, and respiratory wheezing. Acute symptoms developed approximately 4 hours after the end of the exposure period. In addition to the requirements of the present Shipyard Instruction for personnel pouring polyurethane plastics, the following is also required: (a) Due to the toxic fumes caused by welding and flame cutting operations on surfaces coated or backed by foamed-in-place plastic when plastic vapors can escape to the work area, welders and burners are to wear air-supplied respirators and must be provided with exhaust ventilation of at least 1000 cubic feet per minute discharged outside the building through a six-inch hose positioned as close to the work or source of vapors as possible (approximately eight inches). (b) All other personnel in the compartment during this type of operation shall wear organic cartridge respirators.

4. An investigation was made of air contaminants liberated in welding and torch cutting steel which has been coated with epoxy resin primer. Welders and cutters have complained about the odor of fumes liberated in these operations; in some instances, they have indicated that inhalation of these fumes resulted in nausea. In manual and submerged arc welding the epoxy coating on the section to be welded is ground to bare metal to a width of 1 or

2 in. Torch cutting and tack welding or welding on short sections is done without grinding off the epoxy coating.

5. Investigation revealed that two employees complaining of effects from welding fumes had been engaged in inert-gas aluminum arc-welding. Available exhaust ventilation was inadequate. The following recommendations were made: (a) Welders doing aluminum work on the FRAM (Fleet Rehabilitation and Modernization) program, when in confined or semiconfined spaces, should be required to wear a half-mask air-supplied respirator designed to be worn under the welding helmet. Welders should also be informed that protective creams are available for protection of exposed skin areas against the strong ultraviolet radiation generated in this process. (b) Associated and assisting tradesmen working in these spaces should be instructed to wear metal fume respirators.

6. A proprietary product used to clean aluminum in preparation for welding has been studied. Tests indicate that it may contain secondary butanol in addition to 4% butyl cellosolve and 2% acidic material. Accordingly, the potential health hazards consist of possible irritation of eyes, respiratory tract, and skin. The inhalation hazard is considered moderate. The material decomposes with heat, forming quantities of sulfur dioxide.

7. Samples have been taken to determine the potential hazard of fluorides arising from silver brazing operations and welding with iron powder electrodes. Three air samples were taken during the silver grazing of flanges onto a pipe section on the hanger deck of a ship. Materials used were a silver brazing alloy and a flux which contains approximately 10% fluorides. Samples taken directly in the fumes were positive for fluorides. Two more air samples were taken during welding of studs onto the floor of the forward elevator of the carrier. The welder was using iron powder electrodes. Visually, there were more fumes from the welding operation than from the silver brazing operation; however, the fluorides were fewer.

8. Potential exposure to alpha particles was investigated during inert-gas shielded arc welding with thoriated tungsten electrodes. These electrodes, containing 1% and 3% thorium, revealed significant activities by direct measurement with a scaler or a scintillation counter. Samples of welding fumes, however, gave activities of the order of 6 disintegrations per minute per cubic meter (alpha) which dropped to 1.7 after 26 hours. The maximum total activity did not exceed 17 disintegrations per minute per cubic meter which fell short of the proposed Atomic Energy Commission limit of 70 disintegrations per minute per cubic meter. Zirconium electrodes may be substituted for the thoriated electrodes.

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We Americans tend to place too much faith in figures. . . . Remember the sad story of the man who drowned in a stream that averaged only two feet deep. — Henry J. Taylor

Removal of Hazardous Soils

Editorial, Hazardous Soils—How to Remove Them. The SBS Counselor 7:3-4, January - February 1961.

An interesting and different approach toward enlightenment on industrial dermatitis and its prevention would be to discuss the various hazardous soils encountered in industry and comment on the means for contact prevention and removal from the skin.

Such a discussion lends itself better to organization for this purpose if the soils are associated with the occupation as well as with a few broad classes of industry. For example, skin hazards facing a welder are likely the same whether he is building a bridge or repairing a machine.

Information for this discussion is taken largely from one of the most up-to-date and complete texts on the subject, Occupational Diseases of the Skin, by Louis Schwartz, Louis Tulipan, and Donald J. Birmingham (Lea & Febiger, Philadelphia, 1957, 3rd edition). These eminent dermatologists are specialists in the occupational phases of the subject. Through the years they have developed a remarkable knowledge of industrial occupations and a deep insight into the skin hazards associated with them. Supplemental comments have to do mostly with added opinions on ways and means of preventing the hazardous soil from contacting the skin and on skin cleaners suitable for removing them.

The problem of cleaning hands in industry —safely—is a dynamic one, constantly changing and becoming more difficult with the many new chemicals and new procedures used in manufacture. Recommendations offered in the text referred to, apply to the situation up to 1957. At that time came the epoxy resins, the polyurethanes and several other chemicals offering skin hazards. Comments applying to the current situation must be modified as new skin hazards—as well as new developments in skin cleaners and protectives—emerge from industry.

Perhaps a further preface to the discussion should be the statement by one of the authors, "cleanliness is the keystone to prevention" (Birmingham). A good skin hygiene program—involving day-to-day cleanliness and the means and motivation for accomplishing it—is certainly as important as dwelling upon the specifics of hazardous soil removal.

Adhesives, Glues and Resins

Adhesives embrace a wide range of substances including cements, pastes, mucilages, and resins. Cements used for adhesion may consist of the alkaline Portland cement, lime, and silica. Caustic soda, asphalt, pitch, rosin, copal, formaldehyde, turpentine, rubber, paraffin, and a variety of waxes are among the irritants found in some cements. The epoxy, polyester, and polyurethane resins also fall into the cement and adhesive group.

Pastes are generally more innocuous than cements or glues. They consist of starches and proteins dispersed in water. They also may contain a wide variety of chemicals. Mucilages are composed of a variety of gelatins

and gums usually dispersed in water. Resin dispersions that polymerize when in contact with the air to form tacky adhesive films may be dispersed in water or a solvent. Another adhesive used to seal cartons in industry is a particular grade of sodium silicate (waterglass).

Adhesives, cements, and glues are so numerous and so widely used in industry that only their general characteristics can be suggested. Few cases of dermatitis have been reported from gelatin and natural resin glues. The casein glues are troublesome if strongly alkaline. Those working among resin glues must be protected from irritating dusts and fumes. Clean overalls should be provided daily to those exposed to irritants. Impervious gloves of washable leather or fabric-lined rubber—and possibly aprons and sleeves—should be furnished to workers applying adhesives.

Facilities for washing the hands with soap and running water should be installed at strategic places for frequent removal of glues from gloves and skin. Brushes, sponges, and other applicators should be changed every two hours or so and workers should keep their glue-soiled hands and gloves away from the face. Compulsory showers should be taken after work. Protective creams, if needed, should be of the water-repellent or oil-repellent types depending on the nature of the adhesive.

The hygroscopic properties and alkaline content of cement are the chief causes of its irritant action to the skin. Dry cement (particularly when insufficient water is added) absorbs moisture from the skin causing it to become dry and cracked after a time. Among workers who perspire freely, cement is likely to cause dermatitis first on exposed parts. Dermatitis from cement is more common in hot than in cold weather. Wet cement may have the same action on the skin; acute dermatitis from cement occurs more frequently among those in the cement mixing operation.

Prevention of contact is difficult in this area; cleanliness should be stressed. Compulsory shower baths after work and daily changes to clean work clothes help. Those inclined to develop dry, cracked skin should wear gloves and rub lanolin into the skin before putting on the gloves and before retiring.

The more recent introduction of cured resins of several types (epoxies, polyesters, and polyurethanes) and their attendant chemicals are causing problems in the areas of skin hazard and soil removal. In general, uncured resins are not troublesome. Curing agents (particularly amines), diluents, and attenuators are the agents hazardous to the skin. Partially cured resins are troublesome because they contain unreacted hazardous chemicals and cling tenaciously to the skin. Details on the hazards of these resins together with suggestions for their removal are found in Tech Notes, volume 3, Nos. 1, 5 and 6. A good quality waterless skin cleaner used frequently on the job before the resins cure on the skin has been found effective in most cases—but not in all.

Use of the non-alkaline type vegetable scrubber-based powdered hand cleaners rather than the borax type is indicated for cement workers troubled with irritations from alkalinity. Use of a skin cream in the acid range (pH around 5) offering a degree of

emolliency and moisture retention is recommended as a protective and conditioning agent. For shower use, liquid or bar soap is required. A new type of medicated cream soap put up in dispensers is particularly suited to shower room use in industry. It is less alkaline than conventional liquid or bar soaps.

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Occupational Medicine Briefs

Ecologic Factors in Warships

The environment of those who live and work in warships is closely related to the way the ships are built and employed. In stating requirements for the atmosphere between decks, emphasis has swung during the past 50 years from need for controlling the chemical constituents to control of the factors which comprise the thermal environment; and now, with advent of the nuclear-powered submarine, to the need for achieving, as nearly as possible, complete physical, chemical, and microbiologic control. Between 1944 and 1953 the thermal factors between decks were investigated in a series of studies carried out in H. M. Ships. The average effective temperatures on the mess decks and in the work places of 11 ships in the Eastern Fleet in 1944 exceeded 84°F (28.9°C). In compartments where radiant heat was an added factor the average corrected effective temperature levels were 1° or 2°F (0.55 to 1.1°C) higher than the corresponding effective temperatures. The effects of climatic conditions on naval personnel were investigated by psychologic studies to determine the levels of warmth at which performance deteriorated; by physiologic experiments to show the levels of warmth at which the collapse of men working at different work rates might be expected; by comfort surveys in ships and on shore to determine the levels of warmth at which the majority enjoyed optimum comfort; and by relating the monthly incidence of the common causes of ill-health to the average monthly upper-deck temperature as recorded at noon each day in order to determine the temperature level above which sickness increased. It was concluded that the upper desirable level of warmth to consider when designing ships for hot climates was an effective temperature of 78°F (25.5°C). (F. P. Ellis, Brit J Ind Med, October 1960; abstracted in Industr Hyg Dig, March 1961)

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High Cost of Slips and Falls

Falls from one level to another are the most expensive accidents in industry. Experience in 6 states shows injuries caused by this kind of fall cost roughly twice as much as injuries involved in other accidents. However, slips and falls that take place on the same level should not be discounted. Accidents to people who skid on grease or trip over pallets that stick out into aisles can cost plenty. Their compensation demands slightly more per case

than ordinary accidents, and there are 12% more same-level falls than falls from one level to another. The number of claims due to falls on the same level about equals the number caused by accidents with machinery. Even compensable automobile accidents take less per case than falls. In Florida, Illinois, Minnesota, New Jersey, New York, and North Carolina, compensation benefits for injuries from motor vehicle accidents averaged $1,129 per case several years ago; benefits for injuries from motor vehicle accidents averaged $1,066. All this does not consider the human factor. It does not tell how much pain, paralysis, wage loss, personal bankruptcy, family upheaval, and emotional and mental wear and tear comes to those who get hurt in falls. Yet the human cost is, in the long run, more important than the immediate financial costs of falls. Business and society alike suffer with the injured workers and their families. (Anon, Occ Hazards, February 1961; abstracted in Indust Hyg Dig, March 1961).

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Control of
Radioactive Vapors

A newly designed activated carbon and stack system to handle radioactive iodine vapor is operated in conjunction with existing air cleaning facilities at the Radioactive Materials Laboratory. The new facility will permit immediate sectioning and chemical and corrosion testing of irradiated samples which otherwise could not be handled until the samples had sufficiently decayed and were safe to handle. Proper operation of the ventilation system depends upon the following factors: (1) assurance that all isolation boxes are sealed; (2) proper equipment operation; (3) proper air balancing; and (4) assurance that the isolation boxes are under negative pressure. The activated carbon filters, 95% efficient, used 2 in a series, provide a concentration reduction of 4×10^4. The system has been found very satisfactory for the containment of radioactive effluents. (T. T. Porembski, Air Cond Heat and Vent, November 1960; abstracted in Industr Hyg Dig, March 1961)

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Cadmium Oxide
Fume Poisoning

Dosage-mortality data have been obtained from 200 g Wistar rats subjected to a single, 15-minute exposure to arc-produced cadmium oxide fumes. Analysis of the results by the probit technic yielded an estimate for the L(Ct)50 of 666 mg min/cu M, with confidence limits of 533 and 764 at the 95% level of probability. For the L(Ct)95, an estimate of 1088 mg min/cu M was obtained, with limits of 896 and 2265. The efficacy of dimercaprol in reducing mortality and in prolonging survival time of rats exposed to 3.1 to 4.5 times the L(Ct)95 of cadmium oxide fumes has been examined in 3 factorially designed experiments. Nearly complete protection against the lethal effect was obtained with a daily dose of approximately 100 mg of dimercaprol administered subcutaneously in divided doses. Two factors—amount of dimercaprol per injection and frequency of injections per day—were varied in these experiments; however, the protection afforded

was found to depend on the total daily dose of dimercaprol. These results have been discussed along with other relevant published data, and it is concluded that a reconsideration of the clinical use of dimercaprol in actual cadmium oxide fume intoxication is warranted. (H. N. MacFarland, Arch Environmental Health, December 1960; abstracted in Industr Hyg Dig, March 1961)

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Garage Ventilation

Carbon monoxide exists in gasoline engine exhaust gases in concentrations ranging from over 10% at idle speed to about 3% at full speed. The amount of carbon monoxide in the exhaust of diesel engines is less than in gasoline engines. Local exhaust systems remove air contaminants at their points of origin before they can escape into the general atmosphere. These systems should be considered because they obtain positive control of contaminants with a minimum amount of air. An exhaust system consists of hoods or enclosures at the sources of air contamination, branch and main ducts through which an air stream transports the contaminant outdoors, a fan to produce the required air flow, and in some cases an air cleaner. (C. R. Ross and L. Rispler, Occ Health Rev, Vol 11, 1960; abstracted in Industr Hyg Dig, March 1961)

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Eye Injuries Due to Power Lawn Mowers

Five cases of missile eye injuries due to power lawn mowers are reported covering a 4-year period beginning September 1955. In 3 cases, vision was totally lost. The need for safety features in the rotary type power lawn mower is stressed. Public awareness of the eye hazard should be aroused. (D. Barsky, Arch Ophthalmol, September 1960)

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